UpTime

The newsletter for: RS-DOS, OS9, OSK, CoCos, and 68xxx's.

Volume 2, Issue 6 February 1994

Editorial

Last month I wrote about the new and emerging technologies concerning the CPUs in the next-generation computers soon to be released. However, the next few years promise to be even more interesting in another area: the development of the Data Highway that you may have heard about from President Clinton's and Vice President Gore's platforms. We're going to be taking a look at this new structure in the next few issues to see exactly where this technology is leading and what it will eventually do for you and the rest of the globe. Our *Data Highway* section contains a brief teaser this month about the highway.

Next month will be out Product Hotline listing with some new additions and corrections. Our regular columns will continue the following month with the addition of the *Data Highway* series.

On a closing note, I'd like to remind you about the upcoming 'Fest planned for Chicago in May. For more information and ticket ordering instructions, see the advertisement elsewhere in this issue.

-Jordan Tsvetkoff

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Navigating the Data Highway

Letters

I am always on the lookout for spare Tandy equipment at flea markets, swap meets, and ham Fests. I picked up a P.B.J. six-slot expansion bus for the CoCo but have been unable to get any documentation, manuals, or directions. Does anyone out there have any of this?

Gerry Spencer, Tampa, FL

[Ed: If anybody has any information, let us know, and we'll pass it along to Gerry.]

BasicO9 in ?? Easy Steps

Hi there. In a previous article, I had told you a few things about BasicO9, and now it is time to do some hands on work. That will be hard if you can not get BasicO9 to run. Rather than jumping in somewhere and hoping you will find the starting point, I will first tell you how to get BasicO9 up and running.

We will be making a bootable diskette (so you can start it by simply typing DOS after you start up your computer) that holds BasicO9 and supporting programs. Also, the computer will boot into OS-9's windows instead of the 32-column green VDG screen.

All of this is nowhere nearly as difficult as it sounds. What you need is your OS-9 system master disk, you BasicO9/Config disk, and a blank diskette. The usual process would be

UpTime

Editor: Jordan Tsvetkoff

UpTime is published 12 times a year by JWT Enterprises, 5755 Lockwood Blvd., Youngstown, OH, 44512. Yearly subscription rates are $15.00, or $7.50 in two installments. Foreign orders (except Canada and Mexico) add $7.00 postage.

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to run the config utility included in OS-9, but I find that cumbersome and tend to stay away from it.

Instead, I will give you a series of commands that will alter a number of device descriptors. This is the equivalent of issuing a series of pokes under DECB. The one reason we cannot use straight pokes with OS-9 is that its code is position independent. This is a fancy term which means that, except for the operating system, no one has a clue where to find the actual code.

OS-9, however, keeps the starting address of every module in memory in one big table. Since all device descriptors have a predefined and strictly adhered to format, we can find the correct byte by specifying an offset from the descriptor's starting address.

Well, enough theory for now. Boot up your computer from your OS-9 system master disk and enter the date and time when you are prompted for it. At the OS-9: prompt, type:

```
modpatch <enter>
```

Modpatch is an OS-9 utility that will do the dirty work for us. As you probably have guessed, there is more to the job then I described above. At the end of the following commands, you must press the `<enter>` key, even if it isn't specified. *Modpatch* has a strange way of echoing characters, so just type in the following lines and keep on going (and don't type in the comments!):

```
l d0            (l as in link)
c 14 00 03      (6ms step rate)
c 18 23 28      (40-track drive)
c 19 01 02      (double sided)
c 1a 00 01      (verify off)
v               (verify module)
```

Some comments: if your drives are really old such that they will only handle 35 tracks and a 30ms stepping rate, don't make the above changes. Verify Off will greatly speed up OS-9's drive access because it no longer has to reread every sector written to disk. Most newer drives are reliable enough anyway. I have run my drives like this for a few years now and never experienced problems because of it. And I will also keep my fingers crossed from now on.

Make sure you do not forget to type the 'v' command. This verifies the updated module. If you forget this, you won't be able to boot your computer from your Basic09 disk.

Since OS-9 has two more descriptors for floppy drives in memory, you must update those also. Type the same series of commands, but change the first line to '`l d1`' and '`l dd`' to access those descriptors.

Next comes your printer. This is locked in at 600 baud, but most printers can take their data in a lot faster.

```
l p             (link to /p)
c 27 02 xx      (changes baud
                 rate)
v
```

Instead of '`xx`', you must enter a code number that represents the baud rate at which you want to communicate with your printer. A table of values can be found on page 6-96 in the OS-9 commands section of your manual. You can choose from values in the range of zero to six.

Last but not least is the terminal

descriptor:

```
1 term
c 19 01 00      (disable end-of-
                page pause)
c 26 01 80      (boot into
                windows)
c 2c 32 28      (40-column
                screen)
c 33 07 00      (foreground:
                white)
c 34 04 02      (background:
                black)
c 35 04 02      (border: black)
v
<break>
```

Note that the numbers dealing with the colors are pointers to register numbers and *not* the color codes themselves. If you want your computer to boot up with an 80-column screen, you must replace 29 in that line with 50.

Now that you have adapted the crucial parts of your system, it is time to save those changes to disk. First we must format a blank diskette. The following commands assume you have 2 disk drives. If not, you will have to replace /d1 with /d0 and swap disks if necessary. Type: `format /d1 "Basic09"` Answer the prompts of the format utility. Once your disk is formatted, you type:

```
cobbler /d1
makdir /d1/CMDS
chd /d1/cmds
copy /d0/cmds/shell
shell
copy /d0/cmds/grfdrv
grfdrv
```

At this point your diskette is bootable. You may want to put it in drive /d0 and press the reset button. The computer should boot without any problems. You can also use this procedure for creating other disks since all bootable disks must carry the information put on this disk. Note that the format of your new disk is double sided 40-track. Now that your disk is ready, you must copy Basic09 and some other programs to it. Start by putting your Basic09/Config disk in drive /d0 and your new disk in drive /d1. Once again, type:

```
chd /d1/cmds
setime
```

and answer its prompt. Then, using the same type of copy commands as above, copy the following programs: *Basic09*, *RunB*, *Gfx*, *Gfx2*, *Inkey*, and *SysCall*. To conserve memory, we will merge some utilities. Type:

```
merge gfx gfx2 inkey
syscall >utilities
```

Now put your OS-9 system master disk in drive /d0 and type:

```
chx /d0/cmds
attr utilities e pe
makdir /d1/SYS
chd /d1/sys
copy /d0/sys/stdfonts
stdfonts
copy /d0/sys/stdptrs
stdptrs
```

You can copy the *stdpats_2*, *stdpats_4*, and *stdpats_16* files in the same way if you would like. These files contain fonts, cursors, and fill patterns to be used on graphics screens. To keep things tidy on your new disk, you will want to create a directory to hold your programs:

```
makdir /d1/SOURCE
```

The last thing we have to do is automate some tasks, like loading the various programs on startup. For that purpose we will create a file called *startup* in the root directory of the Basic09 disk. Type:

```
chd /d1
edit startup
```

At the `E:` prompt, type the following lines (and start them with a single space):

```
load utilities
setime </1
load basic09
```

Exit this program by typing 'q' as the first character of the line and then press `<enter>`. Your Basic09 system disk is now ready to go. Next time you want to use it, you can boot your computer from this disk, enter the date and time, and then type the following commands:

```
chd /d0/source
basic09 [#16k]
```

Note that the memory modifier is optional. By default, Basic09 starts with 8K of space available. With the modifier, you can give it up to 40K of space if you don't want to use the *SysCall* or *Gfx* modules. For most purposes, a value of 16K or 24K is more practical.

Basic09 consists of two parts: the editor/compiler and the code that actually runs the I-code. This latter part is also available in a separate module called *RunB*. This module is used to run packed I-code. That's it folks! Next time we'll try to run some code.

- Chris Dekker

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Real World Applications

I've always felt that one of the best applications for a Color Computer was that of a "dedicated embedded controler": the "brains" of some special project. In fact, CoCos have been used in the past as the brains of medical instruments, exercise equipment, and other commercial products. For those of you who own and are familiar with Color Computers, the CoCo is an especially good choice for a unique, dedicated, special product that requires "smarts" to control other equipment. It's very low cost. CoCo 2's are still commonly found at local thrift stores and flea markets selling for around $5 to $15 each in my area. It's highly reliable. I once encountered a group of CoCo 1's that were operating a game that modeled parts of the federal reserve system in the lobby of a federal reserve bank that had been running daily for 6 years with no problems. They were essentially stock machines, with the only significant addition of a fan over the power supply.

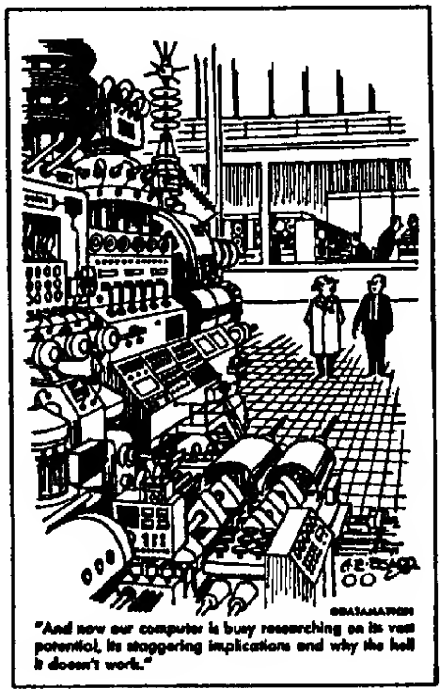
What about getting connections to the "real world"? For just turning a single thing on and off, one can use the cassette motor relay. Under BASIC, the commands MOTOR ON and MOTOR OFF will control this relay. The contacts of the relay are accessible on pins 1 and 3 (the two pins immediately on either side of the notch) on the 5 pin DIN cassette recorder port of the CoCo. These contacts can control a low voltage, low current source of power. But if you use them to control a low voltage that in turn controls a respectable size relay, you can easily use the CoCo to control 110 volt AC devices. I recently answered some questions about this for a chap who wanted to use his CoCo to control his color enlarger, so he could program in all sorts of special timing protocols he used. That's an excellent example of a case where a SINGLE on/off switch is all one needs to be controlled by the computer.

The joystick port on the CoCo provides four (multiplexed, of course) 5 bit (0 to 63 integer) resolution A to D inputs. A voltage between 0 and 5 volts presented to the wiper pin of the joystick connections is translated into a number between 0 and 63. This can be done from BASIC using the command to read the joystick. Pins 1 and 2 on each of the two 6 pin DIN joystick ports are the joystick wiper inputs. These two pins are the first two pins as one goes clockwise around the female connector, with the notch at 12 o'clock.

The cassette connector has a zero crossing detector that sophisticated assembly language programmers have used to analyze complex signals, as in the WEFAX program for the CoCo.

If you need a whole bunch of I/O lines, you can make up an I/O card for the CoCo by interfacing one or more 68B21 PIA chips. It's pretty trivial... all that's needed is a single PAL chip (or two small scale logic chips) to do address decoding, in addtion to the PIA chip itself. For one or two of a kind applications, though, one can "cheat" by piggybacking a PIA on top of the existing 6821 chip. Piggyback the power, ground, reset, clock, and data in lines. You'll need to interrupt the chip select signal to the original PIA that comes out of the LS138 chip on the CoCo, and OR that signal with the A3 address line in one case, and an INVERTED A3 address line signal in the other case. The two resultant signals can be used to enable the original PIA and the added PIA, respectively. That way, the original PIA will be addressed a $FF20-$FF23, and the added one will be addressed at $FF28-$FF2B. Now you have 16 lines of TTL level I/O, each of which may be programmed to be either an input or an output.

- Marty Goodman



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The OS-9 Advantage

Myths come to have a life of their own; read any of Jan Brunvand's books on urban legends for evidence. If you see enough people claiming OS-9 is hard to learn or use, you'll believe it and not even try to find out for yourself.

OS-9 is *not* hard to learn or to use. You really needn't even know some of the few simple concepts that underlie OS-9 to take advantage of them. For example: everyone presumably has heard by now that OS-9 is a true multitasking operating system, even if they don't know what that means. Applications can take advantage of this with features such as allowing the user to escape to the shell to enter commands, even though the user doesn't know that OS-9 makes it easy for the program's author to provide that feature. (It takes vast quantities of kludgery to provide a similar, though in fact less powerful, effect on a non-multitasking operating system.)

Then, I guess there are those who have a hard time with such "cryptic" OS-9 commands as format, preferring the "intuitively obvious" DSKINI. I think this just shows that people can get used to anything. I hope that you will take some time to learn the facts, and think for yourself.

So, what are those few simple concepts I mentioned? I think that they are the following: users, processes, time slicing, signals, I/O paths, directories, and modules.

USERS:

It shouldn't be too hard to figure out users. You and I are users; we sit down at the computer and use it. Like whoever hired the protagonist of Secret Agent, OS-9 gives us a number and takes away our names. Any entity in OS-9 that is owned by a user actually has a number that corresponds to the user that owns it. If your OS-9 system is set up to run the *tsmon* program, then when you log in, the *login* program looks up the name you used and finds the corresponding user number, so that you will appear to OS-9 as who you claim to be. (You wouldn't lie, would you? If you would, well, that's what passwords are for.)

Just as on The Prisoner, Number One was special, under OS-9, there is a special user number. Instead of Number One, it's Number Zero. User number zero, often called "the superuser," gets to bypass the protection mechanisms the operating system imposes. This is why most OS-9 systems intended for use by multiple users insist on running tsmon, rather than just coming up presuming that the superuser wants to use the system, which is how OS-9 for the CoCo is set up to run by default.

PROCESSES:

The process is the active entity of OS-9; that is, it is what actually executes instructions. Processes, like files, are owned by users, and a user can have more than one process at a time. (Indeed, whenever you run a program, a process is created to run it, so that for the time it takes to run that program, you typically have at least two processes— one of them runs the shell, the usual command interpreter, and another runs the program.)

The analogy for multitasking that comes to mind is perhaps somewhat odd: it is that of multiple personality disorder. The various personalities are somewhat like processes; they have their own memories, just as processes are given private areas of memory by the operating system kernel. They share a single brain, just as processes take turns executing on a CPU.

Processes aren't always running— sometimes, they are waiting for a resource. When the process that runs the shell is sitting there, with the "OS9:" prompt on the screen, it is waiting for a I$ReadLn system call to complete, which will happen as soon as you enter a line of input. The shell will then try to interpret that line as a command of the sort it understands.

- James Jones

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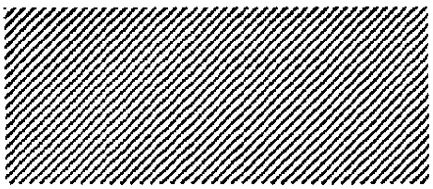

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- Does have OS-9 articles concerning the CoCo. We've just started an excellent Level II tutorial series.
- Does have Basic program technique article & tutorials.
- Does carry a full variety of in-depth articles and reviews.
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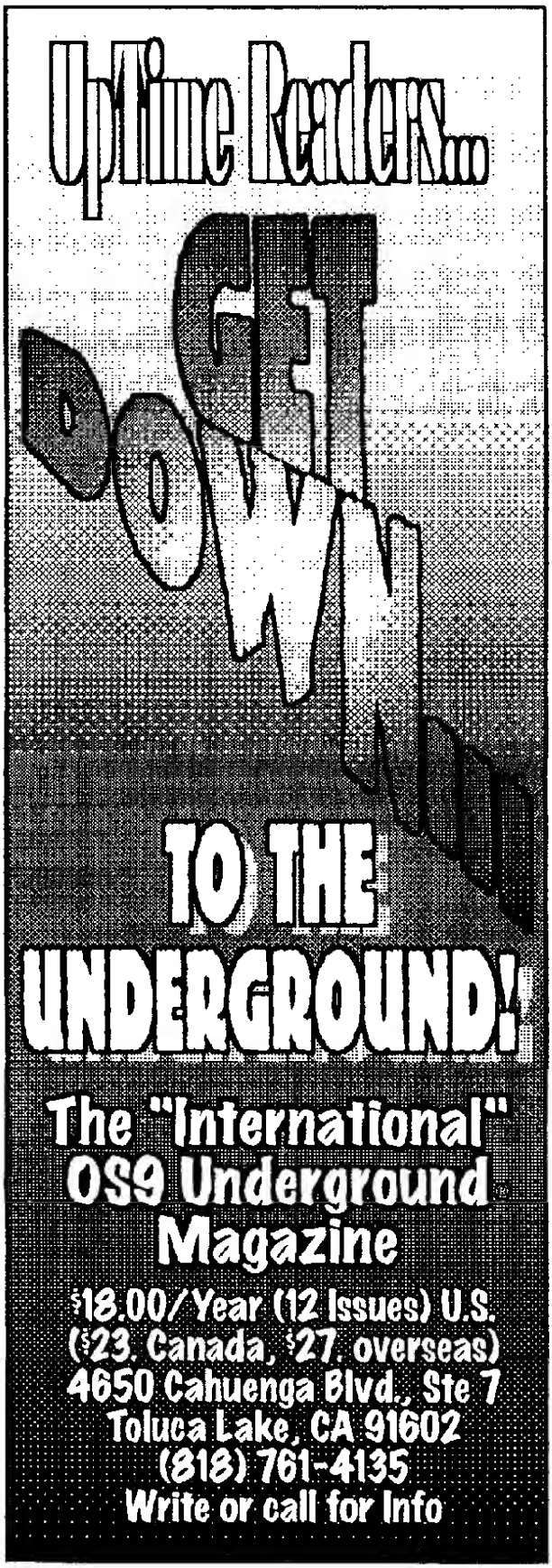

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Data Highway

The Data Highway. It almost invokes a picture of a massive architecture of tubes through which flows little ones and zeroes that transform themselves into highly complex information that runs the world as we know it. Think for a minute about all the different uses of current data networks: there is the obvious use of electronic mail, remote logins to information services such as Compuserve, Delphi, GEnie, American Online, and Prodigy (to name a few), transferring of files between computers, and distributed computing applications where a program may run on many different computers scattered around the country at the same time. But think also of the other uses, such as interconnecting the networks of various regional offices of a large corporation into a WAN (Wide Area Network), allowing ATMs to transfer money from your bank to anywhere in the world, allowing the telephone system to handle millions of calls simultaneously, routing and billing each call to the appropriate parties, and distributing cable television programming across satellites to local boosters which ultimately feed your homes.

Although some of these may not seem like a true 'network' as we usually use the term, each service is distributing a form of information, which is what a network is all about. In the next few issues, we are going to explore how this new technology will probably evolve and how you are going to see and feel its presence in society. And it may come sooner than you think: some of the advances will probably happen within the next two years. And some of it is already in place: the global Internet is a precursor of what the impact this network will have on the United States and ultimately the world, as country-wide networks join forces.

-Jordan Tsvetkoff

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